



Machine Transplanted Rice as Influenced by Varieties and Age of Seedlings

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ABSTRACT

A field experiment was conducted during *kharif*, 2013 at Agricultural College Farm, Bapatla to find out the response of high yielding rice varieties and age of seedlings with machine transplanting. Four varieties *i.e.*, BPT 5204, BPT 2270, NLR 145 and BPT 3291 and three ages of seedlings viz., 2, 3 and 4 weeks old were tested in split-plot design with three replications. Results revealed that 2 weeks old seedlings recorded higher values of growth parameters, CGR, RGR, yield components and yield, which were on par with 3 weeks old seedlings, whereas lower values were recorded with 4 weeks old seedlings. The cultivar, BPT 2270 recorded higher plant height, tillers m⁻², drymatter, CGR, RGR and higher yield attributes, whereas higher test weight was recorded with NLR 145. Among the varieties tested, BPT 2270 registered overall increased yield followed by BPT 5204, NLR 145 and BPT 3291 with all the three ages of seedlings.

Key words : Age of seedlings, Machine transplanting of rice, Varieties of rice.

Rice (*Oryza sativa* L.) is the principal food crop for billions of people throughout the world. In India, it is grown in an area of 44.5 m. ha with an annual production of 92.32 m. t with a productivity of 2,185 kg ha⁻¹ (Directorate of Economics and Statistics, 2012-13).

Rice cultivation is considered to be labour intensive and water consuming, which are becoming scarce year by year. Transplanting often gets delayed due to non-availability of labour. The late planted crop has low productivity plant⁻¹ due to restricted vegetative growth and also more susceptibility to pests and diseases. To make rice cultivation more labour independent and financially viable, introduction of mechanised farming is becoming inevitable. Machine planting is a viable alternative at times of scarce availability and higher cost of labour (Venkateswarlu *et al.*, 2011).

Appropriate age of seedlings is essential for obtaining uniform stand, which has a significant influence on tiller production, yield attributing characters and grain formation. Seedlings of 14-16 days age are transplanted under machine planting. Very young (less than 14 days) seedlings tender to be held by fingers of transplanter and over aged seedling develop inter-tangled root mass which may break during finger stripping action. Delayed planting due to late release of water in canals and unwarranted situations, the farmer is

forced to advance the age of nursery upto 30 days as that of normal planting. Choice of variety to suit for machine transplanting with aged nursery may be a better option to minimize the yield reduction.

MATERIAL AND METHODS

A field experiment was carried out during *kharif*, 2013 at Agricultural College Farm, Bapatla, Andhra Pradesh, situated in Krishna zone of Andhra Pradesh where the soil was clay loam in texture, low in organic carbon, neutral in reaction, low in available nitrogen, low in available phosphorus and high in available potassium.

Four varieties *i.e.*, BPT 5204, BPT 2270, NLR 145 and BPT 3291 taken in the main plots and three ages of seedlings *i.e.*, 2, 3 and 4 weeks old seedlings in the sub plots, replicated thrice in split plot design. Tray nursery was raised for machine transplanting. Seedlings of different ages were ensured by staggered sowing in tray nursery. The seedlings in trays were transplanted on 22nd August, 2013 at a spacing of 30cmX15 cm with 6-row transplanter. The crop was raised by following recommended package of practices.

RESULTS AND DISCUSSION

Growth parameters

The data on growth parameters is presented in Table 1. The growth parameters of rice such as

Table 1. Growth parameters of machine transplanted rice as influenced by varieties and age of seedlings.

Particulars	Plant height (cm)	Number of tillers m ⁻²	Drymatter production (kg ha ⁻¹)	CGR (g m ⁻² d ⁻¹)	RGR (g g ⁻¹ d ⁻¹)	Days to 50% flowering	Days to maturity
Varieties							
BPT-5204	102.3	398	15655	18.6	0.0035	114	146
BPT-2270	110.2	433	16638	20.0	0.0037	122	159
NLR-145	100.3	358	14101	15.1	0.0026	105	137
BPT-3291	96.8	324	13372	14.0	0.0024	103	135
SEm±	2.08	10.6	432.0	0.44	0.0001	0.3	0.5
CD (p=0.05)	7.2	37	1495	1.5	0.0003	0.9	1.8
CV%	6.1	8.4	8.7	7.8	8.1	0.7	1.1
Age of seedlings							
2 weeks	108.0	402	16381	18.6	0.0036	107	141
3 weeks	102.7	382	15379	17.7	0.0035	111	144
4 weeks	96.5	352	13065	14.5	0.0022	116	148
SEm±	2.02	9.4	336.4	0.36	0.0001	0.3	0.5
CD (p=0.05)	6.1	28	1009	1.1	0.0002	0.8	1.5
CV%	6.8	8.6	7.8	7.4	7.9	0.8	1.2
Interaction	NS	NS	NS	NS	NS	NS	NS

Table 2. Yield attributes and yield of machine transplanted rice as influenced by varieties and age of seedlings

Particulars	Productive tillers m ⁻²	Panicle length (cm)	Filled grains panicle ⁻¹	Test weight (g)	Grain yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Harvest index (%)
Varieties							
BPT-5204	328	21.2	173	15.4	5986	7474	44.8
BPT-2270	346	22.0	209	21.2	6579	7921	45.4
NLR-145	303	21.0	151	22.2	5746	6809	45.8
BPT-3291	284	19.1	137	20.6	5360	6414	45.6
SEm±	6.2	0.23	4.2	0.57	164.4	175.3	1.08
CD (p=0.05)	21	0.8	15.0	2.0	569	607	NS
CV%	5.9	3.3	7.5	8.7	8.3	7.4	7.1
Age of seedlings							
2 weeks	336	21.6	183	20.2	6306	7841	44.7
3 weeks	317	20.7	167	20.0	5932	7295	44.9
4 weeks	292	20.2	153	19.5	5515	6327	46.6
SEm±	6.7	0.29	2.4	0.42	130.9	184.0	0.99
CD (p=0.05)	20	0.9	7.0	NS	393	558	NS
CV%	7.3	4.8	5.0	7.2	7.7	8.9	7.6
Interaction	NS	NS	NS	NS	NS	NS	NS

plant height, number of tillers and drymatter production measured were significantly influenced by the varieties and age of seedlings. Among the varieties tested, plant height was significantly the highest with BPT 2270 over other varieties. However, BPT 5204 was on par with varieties i.e. NLR 145 and BPT 3291. Significantly higher number of tillers m⁻² and drymatter production were recorded with BPT 2270 and it was on par with BPT 5204. However, lower number of tillers m⁻² and drymatter production were observed with BPT 3291 which was comparable with NLR 145. Among the different aged seedlings, plant height, number of tillers m⁻² and drymatter production were significantly higher with transplanting of 2 weeks old seedlings followed by 3 weeks and 4 weeks old seedlings. Husain *et al.* (2012) also found the similar performance of younger seedlings of rice over the aged seedlings.

Days to 50% flowering and days to maturity were increased gradually with successive advancement in the age of seedlings. Among the four tested varieties, BPT 3291 came to flowering and maturity earlier than NLR 145, BPT 5204 and BPT 2270. The 2 weeks old seedlings took less number of days to flowering and maturity than other two ages. Aged seedlings required more days to panicle initiation due to the slow establishment of the seedlings in the main field unlike the younger seedlings (Krishna and Biradarpatil, 2009).

The data on crop growth rate (CGR) and relative growth rate (RGR) presented in Table 1, revealed significant differences among the varieties and ages of seedlings for both CGR and RGR at 90 DAT-maturity. Among the varieties tested, BPT 2270 recorded higher values of CGR and RGR, followed by BPT 5204, NLR 145 and BPT 3291. Among the age of seedlings, maximum CGR and RGR were recorded with 2 weeks old seedlings followed by 3 weeks and the least in 4 weeks old seedlings. The higher CGR and RGR values in 2 weeks old seedlings might be due to more tiller production and drymatter production. Similar results were reported by Rama Rao and Balakrishna Reddy, 2011.

Yield attributes & yield

The data on yield components and yield are given in Table 2. The yield attributes viz.,

productive tillers, total and filled grains panicle⁻¹ and panicle length were significantly influenced due to varieties and age of seedlings and they were higher in BPT 2270 followed by BPT 5204, NLR 145 and BPT 3291. Productive tillers, total and filled grains panicle⁻¹ and panicle length were higher in 2 weeks old seedlings followed by 3 weeks and 4 weeks old seedlings. Similar results were reported by Hussain *et al.* (2012). The test weight was not influenced by the age of seedlings. Among the varieties, significantly higher test weight was recorded with the variety, NLR 145 and the lowest with BPT 5204.

The varieties and age of seedlings significantly influenced the grain yield, straw yield but not the harvest index. Among the four tested varieties, the cultivar BPT 2270 recorded higher grain yield and straw yield followed by BPT 5204, NLR 145 and BPT 3291. Among the different aged seedlings, 2 weeks old seedlings recorded higher grain yield and straw yield than the other two ages of seedlings which was at par with 3 weeks old seedlings. The higher yield in 2 weeks and 3 weeks old seedlings might be due to higher plant height, drymatter production, productive tillers and filled grains panicle⁻¹. Pasuquin *et al.* (2008) and Naresh *et al.* (2012) also found the superior performance of younger seedlings of rice over the aged seedlings.

The interaction effect between varieties and age of seedlings on growth parameters, yield attributes and yield was not significant.

Conclusion

From the results, it can be concluded that 2 weeks and 3 weeks old seedlings produced higher plant height, drymatter, CGR, RGR, yield attribute and yield. Hence, either 2 weeks or 3 weeks old seedlings of rice cultivar BPT 2270 was found to be optimum to realize higher yields under machine transplanting for clay loam soils of Bapatla in Krishna Zone of AP.

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(Received on 31.07.2014 and revised on 04.06.2015)